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(54) Abstract Title
Method and apparatus for attaching a releasable fastener to a web material

(57) Apparatus for fixing zippers to webs suitable for retrofit installation on a form-fill-seal machine for making filled bags or pouches from a continuous web 24 of base material comprises means for supplying cut lengths of zipper singly to a feed-in point 1 of a stepwise rotatable turret device 20 and a sealing station 3 where the zipper and base material are sealed together transversely to the direction of movement of the web. The rotating turret device 20 has a second station 2 where the ends of the zipper are crushed by a crusher 32 to ensure the zipper profiles are mated together in order to start the closing of the profiles on the finished bags. The zipper and base material are sealed together between a sealer 36 and a retractable pressure plate 34. A second set of sealing jaws (42, Figure 5) may be provided downstream of the main end sealing jaws 34, 36 for sealing the flanges of the zipper to the web material. The second set of sealing jaws (42) may be spring loaded.

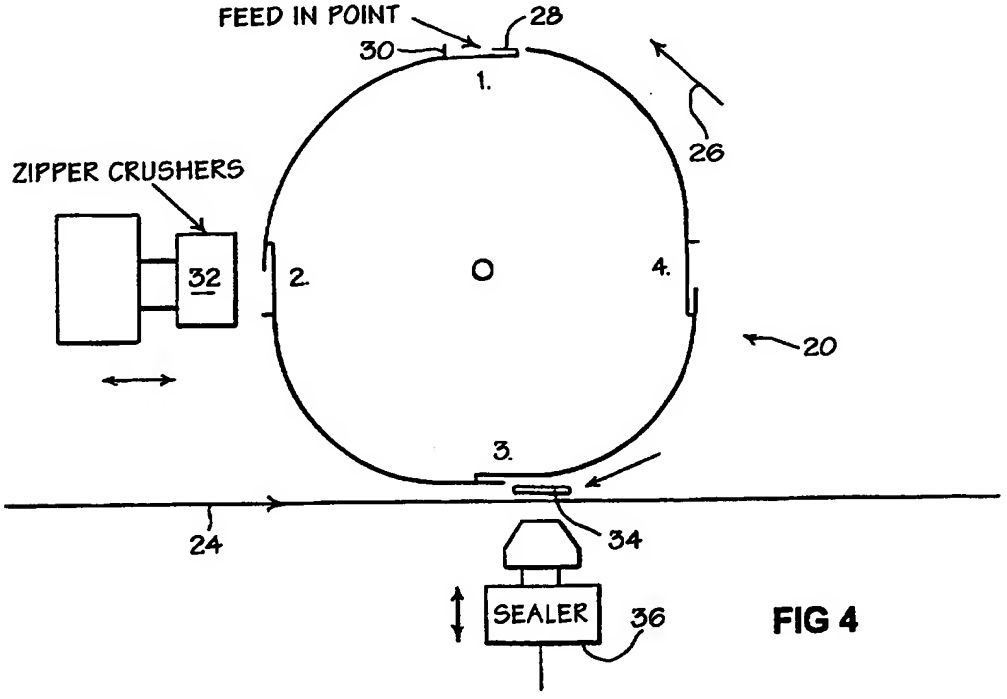

FIG 4

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

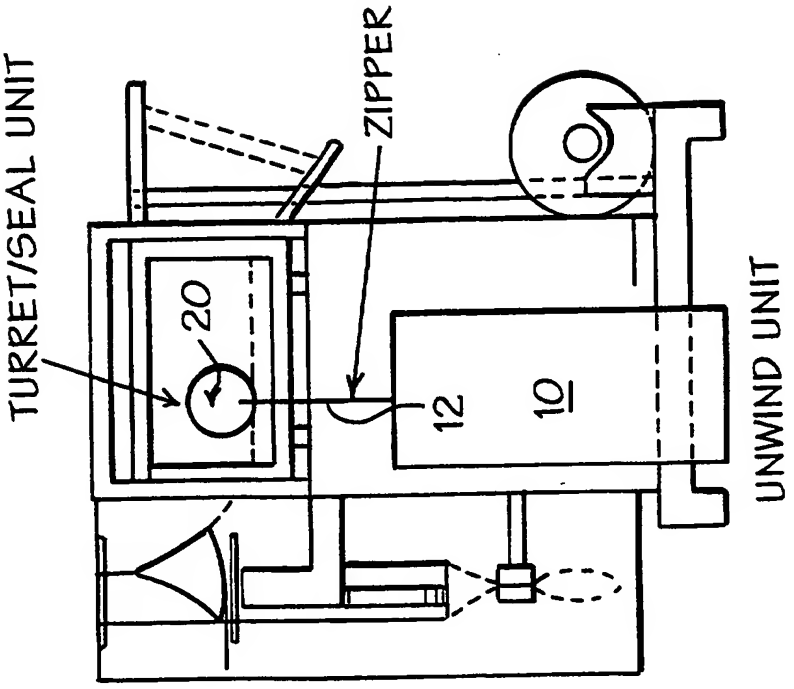
TURRET/SEAL UNIT
ZIPPER
20
12
10
UNWIND UNIT

FIG 2

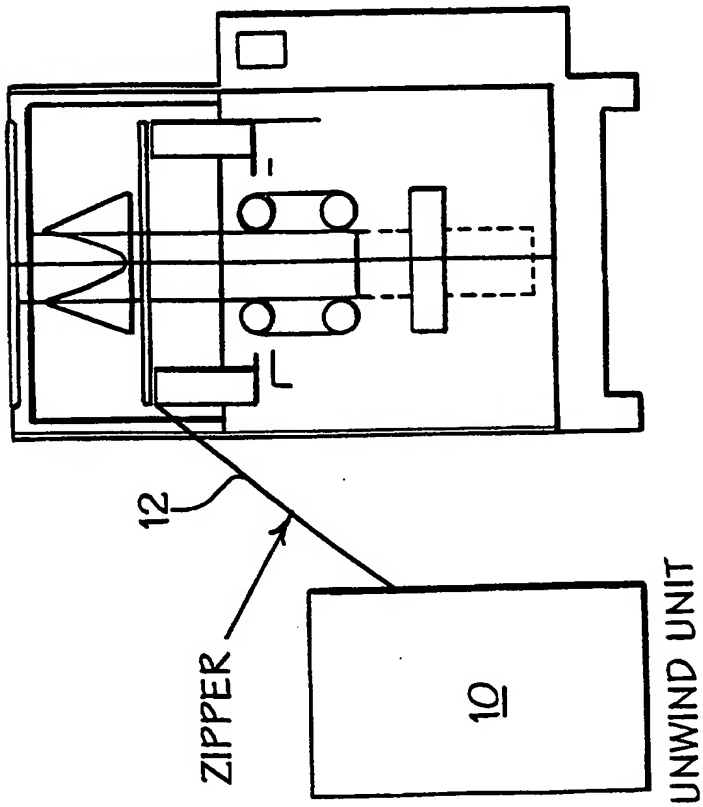
12
ZIPPER
10
UNWIND UNIT

FIG 1

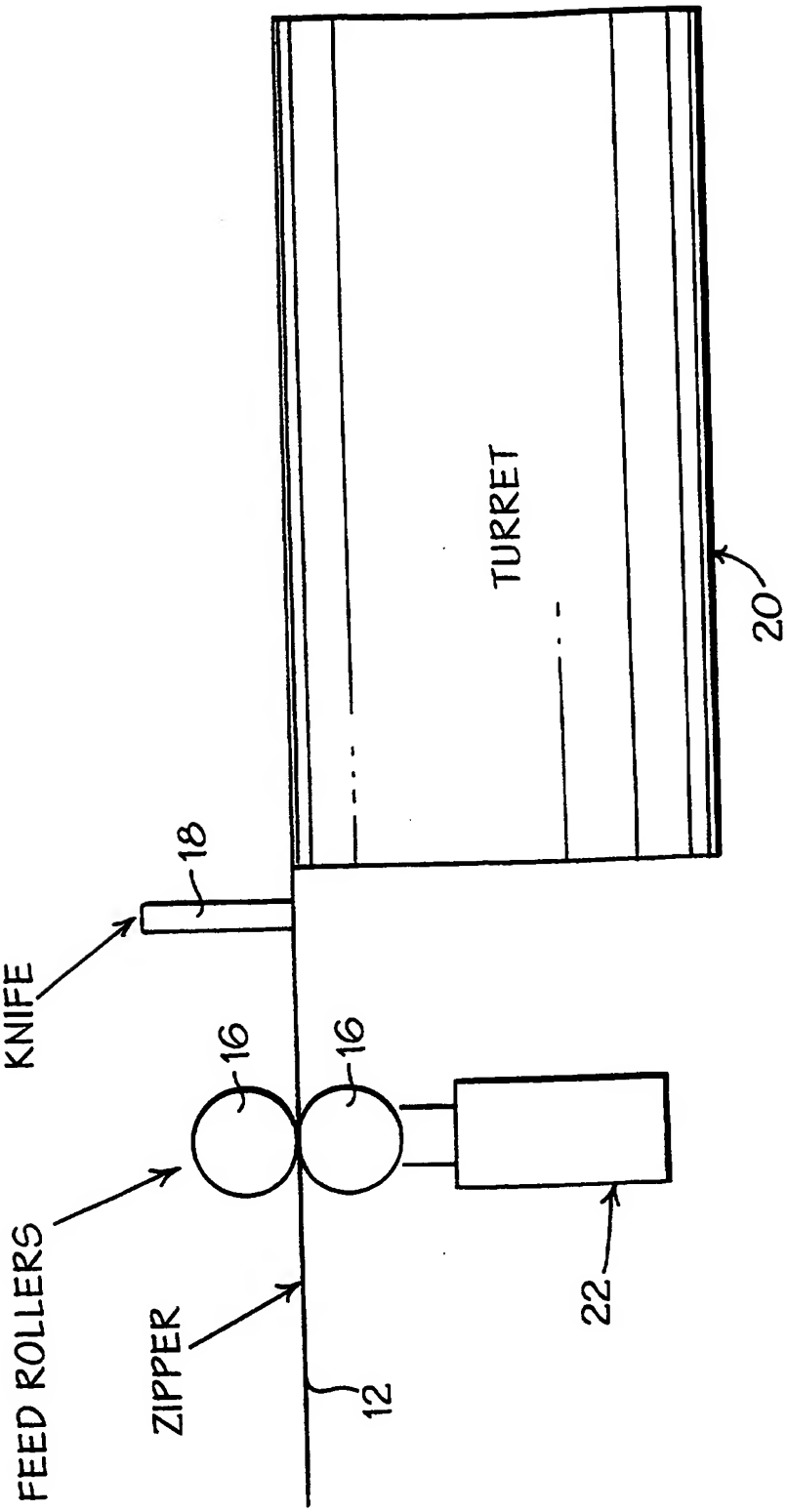

FIG 3

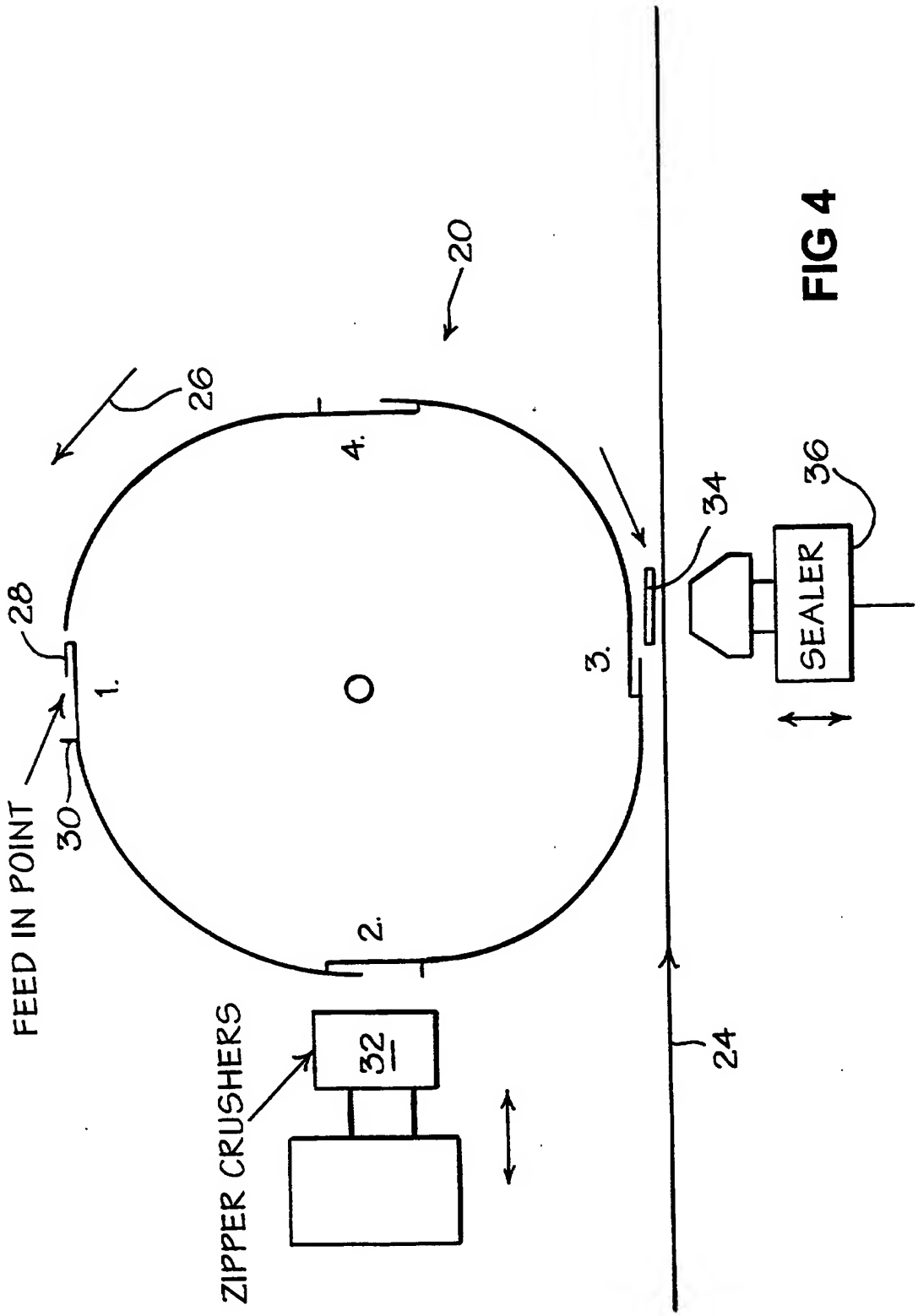
20
26
28
FEED IN POINT
30
1.
2.
3.
4.
34
36
SEALER
ZIPPER CRUSHERS
32
24

FIG 4

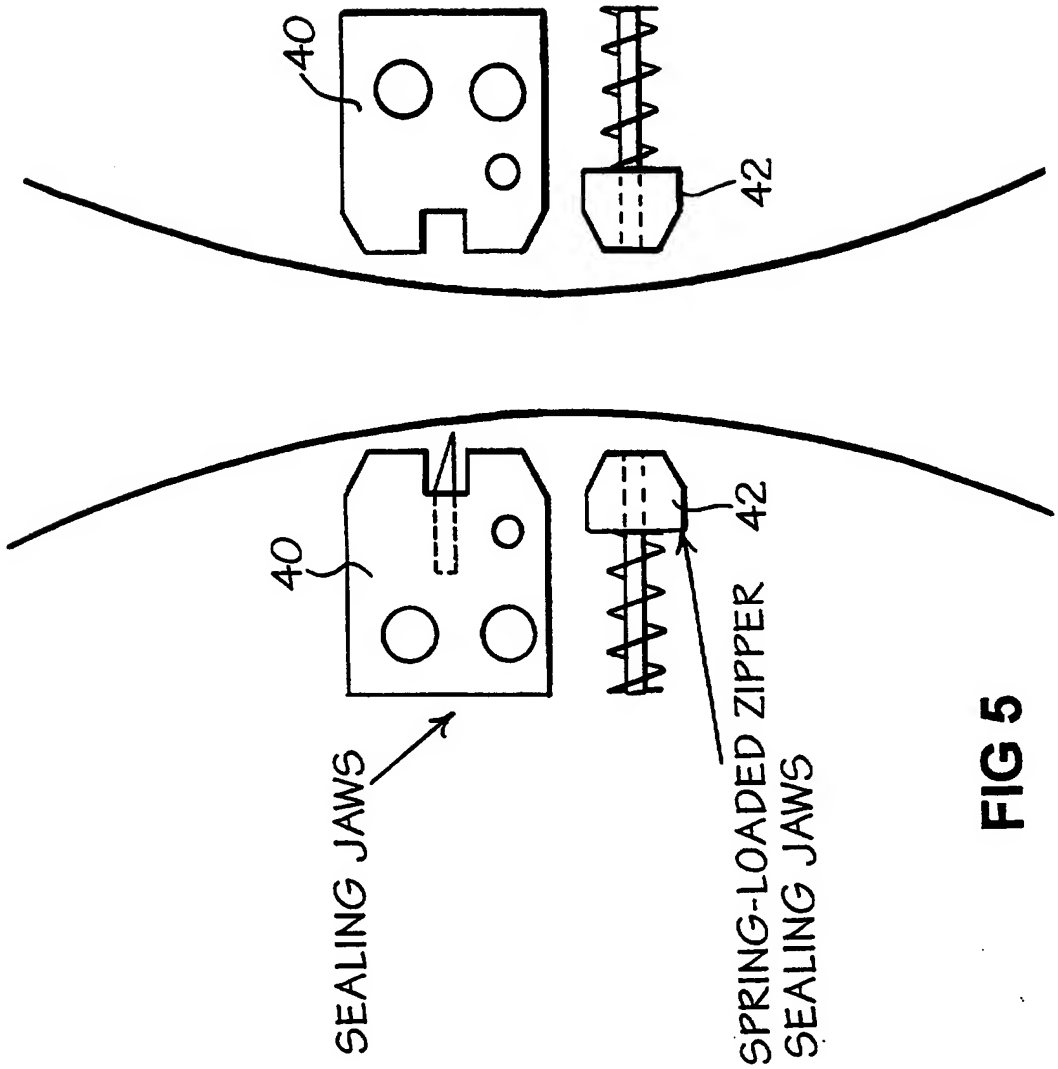

FIG 5

RETROFIT SYSTEM FOR VERTICAL FORM, FILL AND SEAL MACHINES

This invention relates generally to retrofit systems to be fitted to a host vertical form, fill and seal machine, and is more particularly concerned with cross web retrofit systems designed to apply a resealable profile or zipper to a base material transversely across the web, i.e. at 90° to the direction of movement of the web, for subsequent progress through the host machine.

It is one object of the present invention to provide a cross web retrofit system which will fit the majority of vertical form, fill and seal machines, and in particular intermittent pull, belt-driven vertical form, fill and seal machines.

Many machines and methods have been developed in the field of cross web technology for the application of zippers transversely across a web of material. It is another object of the present invention to provide a cross web retrofit system which can be fitted to an existing form, fill and seal host machine in order to enable such machines to take advantage of cross web technology.

Broadly in accordance with one aspect of the present invention there is provided a cross web retrofit system which comprises means for supplying zipper, means for feeding the zipper from the supply and cutting it to length, and a rotatable turret device to which the cut zipper is fed, the turret device being rotatable stepwise and being arranged to present the zipper to a sealing station at which the zipper is sealed to a base material transversely to the direction of movement of the base material.

Broadly in accordance with another aspect of the

invention there is provided a method of fixing a zipper to a base material which comprises cutting a zipper strip into predetermined lengths, feeding the cut lengths to a rotatable turret device which is rotatable stepwise, and using the turret device to present the zipper to the base material at a sealing station where it is sealed to the base material transversely to the direction of movement of the base material.

Broadly in accordance with a further aspect of the invention there is provided apparatus for sealing a zipper to a base material, which comprises a turret device which is rotatable stepwise, the turret device having at least three stations, at a first of which lengths of zipper are fed to the turret device and held thereby, at a second of which the ends of the zipper are crushed together, and at a third of which the zipper is sealed to a base material transversely to the direction of movement of the base material.

The cross web retrofit system of the present invention preferably comprises the following components:

a) Unwind stand

b) Zipper feed and cut unit

c) Rotating turret

d) Primary seal unit

e) Modified forming assembly

f) Spring loaded seal bars

In essence, the cross web retrofit system of the present invention takes a resealable profile or zipper from a standard reel and feeds it from a standard unwind stand through a servo-driven set of nip rollers and a guillotine which measure and cut the zipper to the correct length. The cut zipper is then fed into a servo-driven rotating turret device which has

four positions and rotates through 90° on each pull of the base material. The zipper is attached to the base material at this point and is then fed past a modified forming device of the host unit and down into a second set of sealers which are located under the main end seal bars of the form, fill and seal machine.

A particular advantage of the retrofit system of the present invention is that it is designed to require only a single signal from the host unit, i.e. the form, fill and seal machine. This signal would normally be generated by the backseal of the host machine. All the other controls for the retrofit system are located within the retrofit unit itself.

Although the cross web retrofit system of the present invention can be used with various forms of zipper, i.e. resealable profile, it is particularly advantageous to use a zipper of the type described in our copending UK patent application GB9827287.5. This discloses a fastener strip comprising a male portion and a female portion which have respective profile members which are interengagable and disengagable, wherein one of the portions is provided with primary sealing means for sealing to a base material, and both of the portions are provided with secondary sealing means for sealing to the base material. In a particularly preferred embodiment, the fastener strip has flanges, with the flanges to one side of the interengagable profile members being provided with posts in close facing relationship and with the secondary sealing means on the outside faces thereof.

In order that the present invention may be more fully understood, one presently preferred embodiment of cross web retrofit system in accordance with the invention will now be described by way of example and with reference to the

accompanying drawings, in which:

Fig. 1 is a schematic front view of the retrofit system;

Fig. 2 is a schematic top plan view of the retrofit system of Fig. 1;

Fig. 3 is a schematic representation of the zipper feed and cut unit, feeding to the turret;

Fig. 4 is a schematic illustration of the turret and the method of sealing the zipper to the base material; and

Fig. 5 illustrates the use of spring-loaded zipper sealing jaws located below the main sealing jaws of the host unit.

Figs. 1 and 2 show the cross web retrofit system of the present invention in schematic form. There is shown an unwind unit 10, the resealable profile or zipper 12 and the turret/seal unit which is indicated generally at 20 in Fig. 2.

The unwind unit 10 is a stand-alone unit of conventional form which permits tension-free feeding of the resealable profile 12 by way of a counter-balanced dancer mechanism. The unit is housed in a chassis which is mounted on castors and is located at the side of the host unit. The control system for the unwind unit is very simple. The resealable profile is pulled from the unit and a dancer bar rises, clearing an eye which sends a signal to a programmable inverter, which controls the motor. The inverter is easily programmed for acceleration, maximum velocity and deceleration, thus ensuring an even tension no matter what the pay-off rate is.

The resealable profile 12 which comes from the unwind unit 10 is taken through a set of rubber-coated servo-driven drive rollers 16 (Fig. 3) which feed out a programmable predetermined length of zipper through a guillotine 18 and

into a rotatable turret indicated generally at 20. The servo drive for the feed rollers 16 is indicated at 22. The bottom feed roller 16 is driven directly from a servo motor in the servo drive 22. Deceleration and stop signals for the drive are provided by photo cells which are located at the top of the rotatable turret. The top feed roller 16 is free-running and spring-loaded to grip the zipper 12. The guillotine 18 comprises an air-driven knife.

Referring now to Fig. 4, this shows the rotatable turret 20. The web of base material to which the resealable profile is to be attached is indicated at 24. The direction of rotation of the turret 20 is indicated by arrow 26. The turret 20 is provided with a first guide 28 and with a second, retractable guide 30. The turret 20 has four functional positions and rotates through 90 degrees on each pull of the web material 24. The turret is servo-driven and includes a cam (not shown) to extend and retract the retractable guide 30.

In position 1, the resealable profile or zipper is fed into the guides 28, 30. Located above the turret are two photo cells (not shown) which are adjustable in the horizontal plane and which determine the deceleration and stop points for the servo-driven feed rollers 16. The turret is dimensioned for the maximum size bag width and there is therefore no need to change any parts on the turret in order to cope with different sizes of bag made from the base material 24.

At position 2 two profile end crushers indicated generally at 32 are provided. At least one of these is adjustable in the horizontal plane. The profile end crushers 32 crush the two ends of the profile together, thus ensuring the profiles are mated together in order to start the closing

of the profile on the finished bag. The crushers 32 are air-operated and heated.

At position 3, the retractable guide 30 is retracted and a retractable pressure plate 34 moves into the illustrated position above the web material 24. A sealer 36 positioned below the web material 24 is advanced towards the web material and effects the sealing of the web material and the profile by pressure against the pressure plate 34. The retractable pressure plate 34 then retracts before the next pull of the web material, in order to allow the profile to exit the turret. Both the retractable pressure plate 34 and the sealer 36 are air-operated and the sealer 36 is heated.

At position 4, the retractable guide 30 is extended again, ready to receive the next length of profile at position 1.

After the resealable profile has been attached to the web material, i.e. film, the combination is then fed past the forming device of the form, fill and seal host unit. The forming device can be conventional, except that the collar and tube must have of the order of 5 millimetres relief in order to allow the passage of the profile. After the forming and filling process the bag material passes down towards the sealing unit. As shown in Fig. 5, the main sealing jaws, i.e. main end seal bars, of the host unit are indicated at 40. A second set of sealers are located below the sealing jaws 40. These are spring-loaded zipper sealing jaws indicated at 42. As well as being spring-loaded they are also heated in order to seal the two upper flanges of the profile to the base material.

The cycle speed of the system of the present invention is dependent on the host unit and the materials used, but

application speeds in excess of 70 per minute can be achieved.

It is to be understood that the present invention is concerned not only with the cross web retrofit system per se but is also concerned with an improved method of and apparatus for the application of a resealable profile to a base material across the web, i.e. by the use of a rotatable turret device.

CLAIMS:

1. A method of fixing a zipper to a base material which comprises the steps of:

- cutting a zipper strip into predetermined lengths,
- feeding the cut lengths to a rotatable turret device which is rotatable stepwise,
- and operating the turret device to present the lengths of zipper to the base material at a turret sealing station where the lengths of zipper are sealed to the base material transversely to the direction of movement of the base material.

2. A method according to claim 1, which includes crushing the ends of each length of zipper at a turret station between receipt of the lengths of zipper and the sealing station.

3. A method according to claim 1 or 2, which includes holding the lengths of zipper on the turret by guide means whose holding function is released at the sealing station, thereby to permit the lengths of zipper to be presented to the base material.

4. A method according to claim 1, 2 or 3, which includes sealing the zipper to the base material at the sealing station between a heated sealing means and a retractable pressure plate.

5. A method of operating a form-fill-seal machine which comprises:

- feeding a continuous length of base material to a stepwise rotatable turret device,
- cutting a zipper strip into predetermined

lengths,

- feeding the cut lengths to a receiving station of the turret device,
- operating the turret device to present the lengths of zipper to the base material at a turret sealing station where the lengths of the zipper are sealed to the base material transversely to the direction of movement of the base material,
- feeding the combination of zipper and base material past a forming device to define an envelope,
- filling the envelope, and
- sealing the base material at sealing jaws to form filled bags or pouches

6. A method according to claim 5, which includes sealing flanges of the zipper to the base material at a second set of sealing jaws downstream from said base material sealing jaws.

7. A retrofit system for installation on a form-fill-seal machine for making filled bags or pouches from a continuous web of base material, which comprises means for supplying recloseable zipper, means for feeding the zipper from the supply means and cutting it into predetermined lengths, and a rotatable turret device to which the cut zipper is fed and on which it is received at a receiving station, the turret device being rotatable stepwise and being arranged to present the zipper to a sealing station at which the zipper is sealed to the web of base material transversely to the direction of movement of the web.

8. A retrofit system according to claim 7, in which the

turret device includes a station between the receiving station and the sealing station at which the ends of each length of zipper are crushed.

9. A retrofit system according to claim 7 or 8, in which the turret device comprises guide means to hold the cut lengths of zipper on the turret, the guide means being arranged to release the zipper at the sealing station.

10. A retrofit system according to claim 7, 8 or 9, in which at the sealing station there is provided heated sealing means and a retractable pressure plate between which the zipper and the web material are sealed together.

11. A retrofit system according to any of claims 7 to 10, which includes a set of sealing jaws downstream from main end sealing jaws of the host machine arranged to seal flanges of the zipper to the base material.

12. A retrofit system according to claim 11, in which the zipper sealing jaws are spring-loaded and heated.

13. Apparatus for sealing a zipper to a web of base material, which comprises a turret device which is rotatable stepwise, the turret device having at least three stations, at a first of which lengths of zipper are fed singly to the turret device and are held thereby, at a second of which the ends of the zipper are crushed together, and at a third of which the zipper is sealed to the base material transversely to the direction of movement of the base material.

14. A method of fixing a zipper to a base material, substantially as hereinbefore described with reference to the accompanying drawings.

15. A method of operating a form-fill-seal machine, substantially as hereinbefore described with reference to the accompanying drawings.

16. A retrofit system for installation on a form-fill-seal machine, substantially as hereinbefore described with reference to the accompanying drawings.

17. A vertical form-fill-seal machine fitted with a retrofit system as claimed in any of claims 7 to 12 or 16.